

2000 Edition

Instructor Manual

1

The Hazardous Materials Table

§172.101 HAZARDOUS MATERIALS TABLE

Syn- taxis	Hazardous materials descriptions and proper shipping names	Hazard class or Di- vision	Identifi- cation Num- bers	PG	Label Codes	Special provisions	(6) Packaging (§173.***)			(9) Quantity limitations		(10) Wessel stor- age	
							Excep- tions	Man- bulk	Bulk	Passenger aircraft	Cargo air- craft only	Loca- tion	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Acetylene, see p- Nitrodimethylamine, Accumulators, electric, see Batteries, see etc.												
D	Accumulators, pressurized, pneu- matic or hydraulic (containing non- flammable gas)	2.2	NA1955		2.2		306	306	None	No limit	No limit	A	
	Acetal	3	UN1988	3		T7	158	202	242	5 L	60 L	E	
	Acetaldehyde	3	UN1989	1		A3, B15, T25, T26, T29	None	201	243	Forbidden			
A	Acetaldehyde ammonia	9	UN1841	8			155	204	242	200 kg	200 kg	A	34
	Acetic acid, oxime	3	UN2332	3		B1, T8	158	203	242	60 L	300 L	A	
	Acetic acid, glacial or Acetic acid so- lution, with more than 80 percent acid, by mass	8	UN2789	8	6.3	A3, A6, A7, A10 B2, T8	154	202	243	1 L	30 L	A	
	Acetic acid solution, with more than 10 percent but not more than 80 percent acid, by mass	8	UN2790	8	6	A3, A6, A7, A10 B2, T8	154	202	242	1 L	30 L	A	
	Acetic anhydride	8	UN1715	8	6.3	A3, A6, A7, A10, B2, T8	154	202	243	1 L	30 L	A	48
	Acetone	3	UN1990	3		T8	158	202	242	6 L	60 L	B	
	Acetone cyanohydrin, stabilized	6.1	UN1541	1	6.1	2, A3, B0, B14, B32, B75, B77, N34, T38, T43, T49	None	227	244	Forbidden			26, 43, 48
	Acetone oils	3	UN1991	3		T7, T30	158	202	242	5 L	60 L	B	
	Acetonitrile	3	UN1848	3		T14	158	202	242	1 L	60 L	D	48
	Acetyl acetone peroxide with more than 0 percent by mass active ox- ygen	Forbidden											
	Acetyl benzoyl peroxide, solid, or with more than 40 percent in solu- tion	Forbidden											
	Acetyl bromide	8	UN1718	8	6	B2, T12, T26	154	202	242	1 L	30 L	C	48
	Acetyl chloride	3	UN1717	3	3, 6	A3, A6, A7, B100, N34, T18, T26	None	202	243	1 L	5 L	D	48
	Acetyl cyclohexanediyl peroxide with more than 82 percent wetted with less than 12 percent water	Forbidden											

HAZARDOUS MATERIALS TRANSPORTATION TRAINING MODULES



U.S. Department of Transportation
Research and Special Programs
Administration

Script

Visual

Narrative

1

Module 1 – The Hazardous Materials Table

2

The Hazardous Materials Table (HMT), 172.101, lists **alphabetically**, by proper shipping name, those materials that the Secretary of Transportation has determined to be hazardous. To properly prepare, offer, or transport these materials in commerce, you must use this Table!

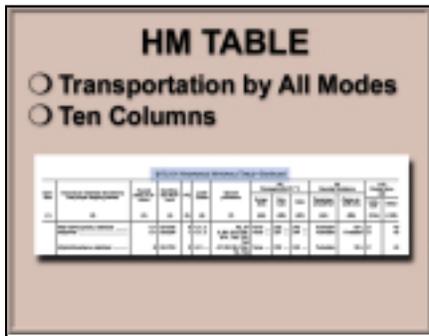
This module assumes that the manufacturer or shipper has already classified the hazardous material.

172.101

STUDENT RESPONSE NOTE 1-2

The Hazardous Materials Table, 172.101, lists hazardous materials alphabetically, by proper shipping name, along with other information for preparing shipments for transportation.

3



It is important to use the Hazardous Materials Table correctly. Open your HMR to the first page of the 172.101 Hazardous Materials Table, usually referred to as the HMT or Table. The Table covers hazardous materials transportation in all modes – air, water, rail and highway.

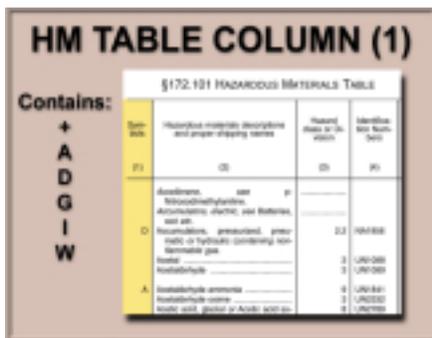
When you have located the Table, notice that it is titled, in bold letters:

172.101 HAZARDOUS MATERIALS TABLE

Under the title are columns with ten (10) major headings. We will discuss each heading starting with column 1.

172.101

4



Column 1 has six symbols: a plus sign (+) and capital letters A, D, I, G, and W.

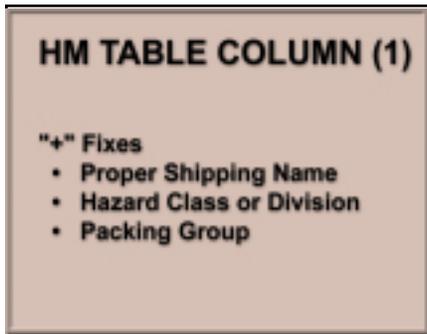
Keep your finger or marker at the first page of the HMT. Now, look at Subpart B, 172.101. It’s about four (4) pages before the Table. Please pause the presentation while you read 172.101(b) and complete STUDENT RESPONSE NOTE 3-4.

172.101; 172.101(b)

STUDENT RESPONSE NOTE 3-4

In the HMT, the six symbols in column 1 are: +, A, D, I, G, and W

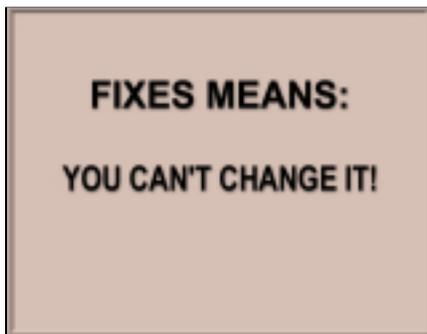
5



The “+” fixes the proper shipping name, hazard class or division and packing group (PG) listed in Columns 2, 3, and 5, of the HMT.

172.101(b)(1)

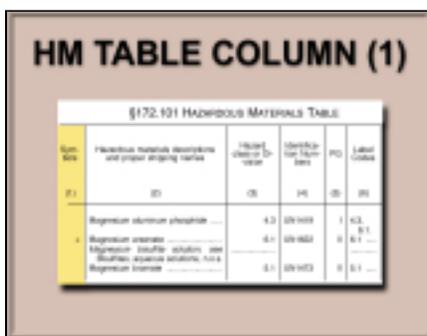
6



“Fixes” means you **may not** change the proper shipping name or the hazard class or division or packing group, even if the material does not meet USDOT’s definition of that hazard class or division. However, an alternate proper shipping name and hazard class or division **may be authorized** by the USDOT’s Associate Administrator for Hazardous Materials Safety.

172.101(b)(1)

7



Student Activity

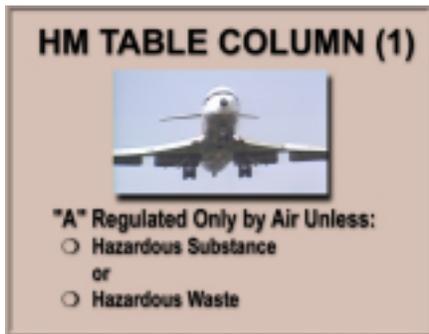
In the HMT, look up the shipping name “Magnesium arsenate.”

Pause the presentation so you can look it up. Notice that “Magnesium arsenate” has a “+” in Column 1 of the HMT.

STUDENT RESPONSE NOTE 5-7

Do not change the proper shipping name, hazard class or division, or packing group of a “+” entry material, unless authorized by the USDOT.

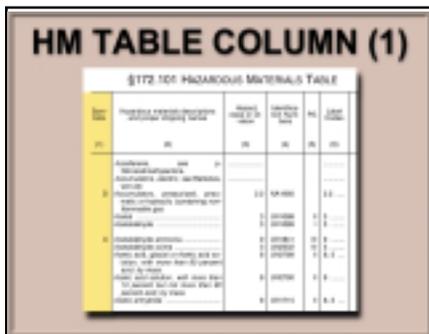
8



An “A” in Column 1 means that the material is only regulated if offered for and/or transported by air, **unless** the material is a **hazardous substance** or **hazardous waste**. Hazardous substances and/or hazardous wastes are regulated in **all modes of transportation**.

172.101(b)(2)

9



Student Activity

Look up the proper shipping name “Acetaldehyde ammonia,” in the Table. Pause the presentation to look up the entry.

Notice that “Acetaldehyde ammonia” has an “A” in Column 1 of the HMT.

172.101(b)(2)

STUDENT RESPONSE NOTE 8-9

“A” means regulated if transported by air, **unless** the hazardous material is also a hazardous substance or hazardous waste. In that case, it’s regulated in **all** modes of transportation.

10

HM TABLE COLUMN (1)

Spun Book	Hazardous materials descriptions and proper shipping names	Hazard Class or Division	Identify for Labels	PG	Label Codes
D	Articles, explosive, extremely insensitive to friction, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D
	Articles, explosive, n.o.s.	1.1	1.1D	1.1	1.1D

The “D” in Column 1 identifies proper shipping names which are appropriate for describing materials for **domestic** transportation. These descriptions may not be acceptable for international transportation.

172.101(b)(3)

Student Activity

Look up the proper shipping name “Aldrin, *liquid*,” Division 6.1, in the HMT. Please pause the presentation to look up the entry. Notice that Aldrin, *liquid*, has a “D” in column 1 of the HMT.

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HM TABLE COLUMN (1)

Spun Book	Hazardous materials descriptions and proper shipping names	Hazard Class or Division	Identify for Labels	PG	Label Codes
G	Articles, explosive, extremely insensitive to friction, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G
	Articles, explosive, n.o.s.	1.1	1.1G	1.1	1.1G

A “G” in Column 1 identifies n.o.s. and generic proper shipping names which require the addition of one or more technical names.

Student Activity

Look up the proper shipping name “Articles, explosive, n.o.s.” Notice that “Articles, explosive, n.o.s.” has a “G” in Column 1 of the HMT.

172.101(b)(4)

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HM TABLE COLUMN (1)

Spun Book	Hazardous materials descriptions and proper shipping names	Hazard Class or Division	Identify for Labels	PG	Label Codes
I	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I
	Sulfur, molten	3	3I	3	3I

An “I” in Column 1 identifies proper shipping names which are appropriate for describing materials for **international** transportation. An alternate shipping name may be selected when only **domestic** transportation is involved.

Student Activity

In the HMT, look up the proper shipping name, “Sulfur, molten,” Division 4.1. Please pause the presentation to look up the entry.

Notice that Sulfur, molten, has an “I” in Column 1 of the HMT.

172.101(b)(5)

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HM TABLE COLUMN (2)

Hazardous material description and proper shipping name	Hazard class or Division	Identification Number	PC	Label Codes
Other	2.1	UN1950	2.1	2.1
Other	2.1	UN1951	2.1	2.1
Other	2.1	UN1952	2.1	2.1
Other	2.1	UN1953	2.1	2.1
Other	2.1	UN1954	2.1	2.1
Other	2.1	UN1955	2.1	2.1
Other	2.1	UN1956	2.1	2.1
Other	2.1	UN1957	2.1	2.1
Other	2.1	UN1958	2.1	2.1
Other	2.1	UN1959	2.1	2.1
Other	2.1	UN1960	2.1	2.1
Other	2.1	UN1961	2.1	2.1
Other	2.1	UN1962	2.1	2.1
Other	2.1	UN1963	2.1	2.1
Other	2.1	UN1964	2.1	2.1
Other	2.1	UN1965	2.1	2.1
Other	2.1	UN1966	2.1	2.1
Other	2.1	UN1967	2.1	2.1
Other	2.1	UN1968	2.1	2.1
Other	2.1	UN1969	2.1	2.1
Other	2.1	UN1970	2.1	2.1

Now look at Column 2 of the HMT. Proper shipping names are in Column 2. Look closely at the two (2) types of letters, Roman and *Italic*.

Proper shipping names are written in **Roman** type **only**. It's critical that the proper shipping name be spelled correctly on shipping papers. Proper response to hazardous material incidents depends on correct identification of the material.

172.101(c)

STUDENT RESPONSE NOTE 15

Proper shipping names are shown in Roman type in the HMT.

16

HM TABLE COLUMN (2)

Hazardous material description and proper shipping name	Hazard class or Division	Identification Number	PC	Label Codes
Other	2.1	UN1950	2.1	2.1
Other	2.1	UN1951	2.1	2.1
Other	2.1	UN1952	2.1	2.1
Other	2.1	UN1953	2.1	2.1
Other	2.1	UN1954	2.1	2.1
Other	2.1	UN1955	2.1	2.1
Other	2.1	UN1956	2.1	2.1
Other	2.1	UN1957	2.1	2.1
Other	2.1	UN1958	2.1	2.1
Other	2.1	UN1959	2.1	2.1
Other	2.1	UN1960	2.1	2.1
Other	2.1	UN1961	2.1	2.1
Other	2.1	UN1962	2.1	2.1
Other	2.1	UN1963	2.1	2.1
Other	2.1	UN1964	2.1	2.1
Other	2.1	UN1965	2.1	2.1
Other	2.1	UN1966	2.1	2.1
Other	2.1	UN1967	2.1	2.1
Other	2.1	UN1968	2.1	2.1
Other	2.1	UN1969	2.1	2.1
Other	2.1	UN1970	2.1	2.1

Student Activity

Please pause the presentation while you look up the proper shipping name for “*Isooctane*” in the HMT.

“*Isooctane*” is printed in italics. The word “*see*” following “*Isooctane*” is also in italics. “See” references another shipping name, “Octanes,” which is printed in Roman type. The proper shipping name for *Isooctane* is Octanes.

172.101(c)

17

HM TABLE COLUMN (2)

**Words in italics
Are Not Part of
Proper Shipping Name**

Words in *italics* are not part of the proper shipping name, but may be used in addition to the proper shipping name.

172.101(c)(2)

18

HM TABLE COLUMN (2)

Spun Bulk	Hazardous materials descriptions and proper shipping names	Hazard class or division	Identification No.	PG	Label Codes
PL	Blue asbestos (<i>Crocidolite</i>) or Brown asbestos (<i>amosite, mysorite</i>)	6.1	UN2812	II	6.1
	Blue asbestos, crocidolite	6.1	UN2812	II	6.1
	Blue asbestos, amosite	6.1	UN2812	II	6.1
	Brown asbestos, amosite	6.1	UN2812	II	6.1
	Brown asbestos, crocidolite	6.1	UN2812	II	6.1

Student Activity

Look up the proper shipping name “Blue asbestos.”

Notice the entry “Blue asbestos (*Crocidolite*) or Brown asbestos (*amosite, mysorite*).” The italicized “or” means that any of the terms in the sequence may be used as part of the proper shipping name, as appropriate.

172.101(c)(2)

STUDENT RESPONSE NOTE 16-18

The word “or” in *italics* means that any of the terms in the sequence may be used as part of the proper shipping name, as appropriate.

19

HM TABLE COLUMN (2)

Spun Bulk	Hazardous materials descriptions and proper shipping names	Hazard class or division	Identification No.	PG	Label Codes
PL	Ethyl alcohol, see Ethanol	3	UN1170	II	3
	Ethyl alcohol, see Ethanol	3	UN1170	II	3
	Ethyl alcohol, see Ethanol	3	UN1170	II	3
	Ethyl alcohol, see Ethanol	3	UN1170	II	3

The word “see” after a shipping name entry refers to another entry. If **both names** are in **Roman** type, you may use either name as the proper shipping name.

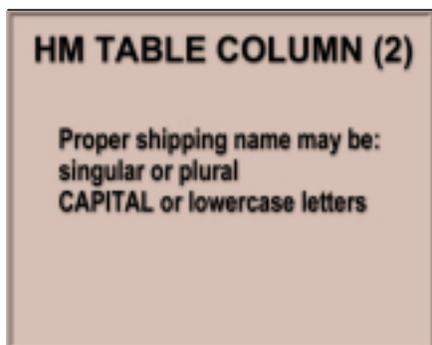
Student Activity

Please pause the presentation while you look up the shipping name “Ethyl alcohol.” Notice that “Ethyl alcohol” is in Roman type and has no hazard class or division or identification number. However, the italicized word “see” refers you to “Ethanol;” look up “Ethanol.”

This is where the hazard class or division **and** the ID No. are located. You may use either “Ethyl alcohol” or “Ethanol” as the proper shipping name since both names are in Roman type.

172.101; 172.101(c)(5)

20



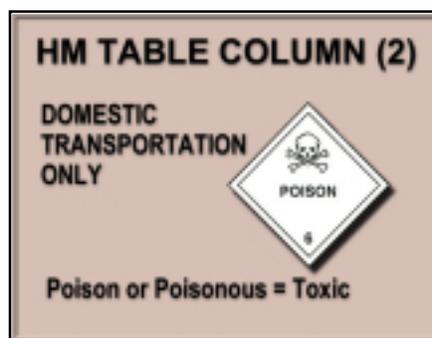
Proper shipping names may be written in the singular or in the plural, in CAPITAL or lower case letters.

172.101(c)(1)

STUDENT RESPONSE NOTE 19-20

Proper shipping names may be written in the singular or plural, in CAPITALS or in lower case.

21

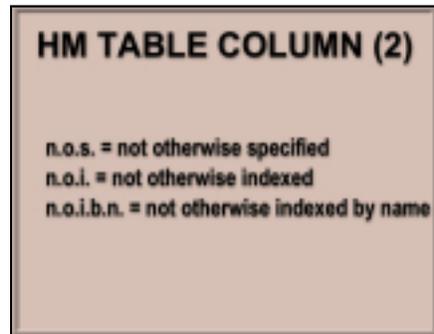


The word “poison” or “poisonous” may be used interchangeably with the word “toxic” when **only** domestic transportation is involved.

A number of abbreviations are interchangeable. For example, sometimes a hazardous material doesn’t have a specific name listed in the HMT but meets USDOT’s definition of a particular hazard class or division, such as **flammable liquids**. In this case, the proper shipping name is the same as the hazard class or division, such as “Flammable liquids,” plus the phrase – “not otherwise specified” or “not otherwise indexed” or “not otherwise indexed by name.”

172.101(c)(3)

22



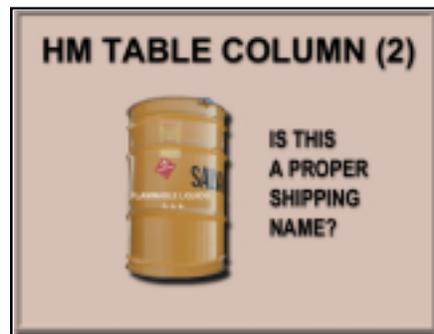
Fortunately, the phrases may be abbreviated, CAPITALIZED or in lower case: “n.o.s.” means not otherwise specified; “n.o.i.” means not otherwise indexed; and “n.o.i.b.n.” means not otherwise indexed by name. They have similar meanings. N.O.S. can be replaced with N.O.I. or N.O.I.B.N. These phrases may also be written without periods (NOI, NOS, NOIBN).

172.101(c)(3)

STUDENT RESPONSE NOTE 21-22

For domestic transportation, the word “poison” or “poisonous” may be used interchangeably with the word toxic.

23

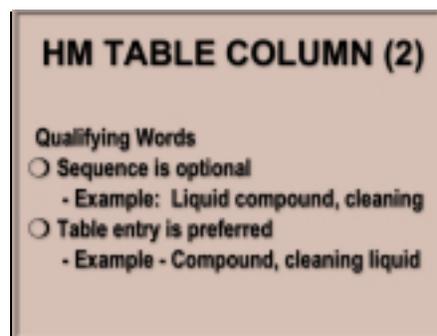
**Student Activity**

Look at the name on this drum. Is it a proper shipping name?

Yes, “Flammable liquids, n.o.s.” is listed in Col. 2 of the HMT and is a proper shipping name.

172.101(c)(3)

24



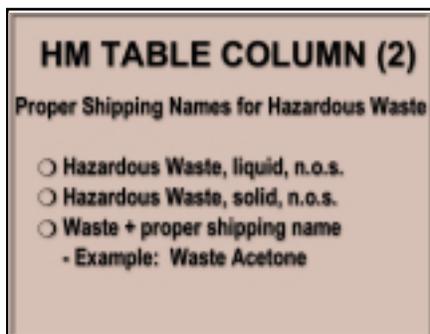
Qualifying words such as liquid, dry, solid, flake or granular may be placed either **before** or **after** the proper shipping name; however, the sequence listed in the HMT is the **preferred** sequence.

For example, the qualifying word in “compound, cleaning, liquid” could be written “liquid, compound cleaning.”

172.101(c)(4)

STUDENT RESPONSE NOTE 23-24

When qualifying words are used, the sequence is **optional**; but the HMT sequence is preferred.

25

When the material is a hazardous waste and the word “waste” is not included in the HMT description, the word “waste” **must** be placed **before** the proper shipping name, for example, “Waste Acetone.”

The word “waste” need not precede a proper shipping name that includes the word “waste,” for example, “Hazardous waste, liquid, n.o.s.” **or** “Hazardous waste, solid, n.o.s.”

172.101(c)(9)

STUDENT RESPONSE NOTE 25

When the material is a hazardous waste and the word “waste” is not included in the HMT description, the word “waste” **must precede** the listed proper shipping name.

26

If a hazardous material has a non-hazardous product added, the material becomes a mixture or solution. Look at the visual: a non-hazardous product “X” is added to the hazardous material, Acetone.

If addition of the non-hazardous product **does not change** the hazard class or division or the general properties of “Acetone,” the proper shipping name becomes “Acetone mixture” or “Acetone solution.”

172.101(c)(10)

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HM TABLE COLUMN (4)

§172.101 HAZARDOUS MATERIALS TABLE

Ident. No.	Hazardous material description and hazard statements	Hazard class or division	Identification No.	PG	Label Codes
101	Acetylene, gas	2.2	101	2.2	2.2
102	Acetylene, dissolved in liquid	2.2	102	2.2	2.2
103	Acetylene, dissolved in liquid, stabilized	2.2	103	2.2	2.2
104	Acetylene, dissolved in liquid, stabilized, in cylinders	2.2	104	2.2	2.2
105	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk	2.2	105	2.2	2.2
106	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk, in bulk	2.2	106	2.2	2.2
107	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk, in bulk, in bulk	2.2	107	2.2	2.2
108	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk, in bulk, in bulk, in bulk	2.2	108	2.2	2.2
109	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk, in bulk, in bulk, in bulk, in bulk	2.2	109	2.2	2.2
110	Acetylene, dissolved in liquid, stabilized, in cylinders, in bulk, in bulk, in bulk, in bulk, in bulk, in bulk	2.2	110	2.2	2.2

Column 4 of the HMT lists the 4-digit identification number assigned to the hazardous material. These 4-digit numbers provide quick identification of hazardous materials. It is critical to emergency responders that the numbers are accurate **and** that they are correctly written and legibly displayed.

172.101(e)

STUDENT RESPONSE NOTE 28

The identification number assigned to the material is in Column 4 of the HMT.

29



ID numbers preceded by “UN” (United Nations) are descriptions of materials for domestic and/or international shipments. ID numbers preceded by “NA” (North America) may be used to describe certain materials when transported within the United States or between the United States and Canada.

172.101(e)

STUDENT RESPONSE NOTE 29

Use UN and a 4 digit ID number for international and/or domestic descriptions.

Some materials have NA and a 4 digit ID number to describe the material when being transported either within the United States or between the U.S. and Canada only.

30

HM TABLE COLUMN (5)

Section	Hazardous material description and proper shipping name	Hazard class or division	Identification number	PG	Other codes
1.1	Acid	3	UN1825	II	
	Acid, organic	3	UN1825	II	
6	Ammonia, anhydrous	2	UN1951	II	
	Ammonia, anhydrous	2	UN1951	II	
	Ammonia, gas, dissolved in water, acid solution, with more than 55 percent	8	UN1951	II, III	

Packing Groups PG I = Great Danger
PG II = Medium Danger
PG III = Minor Danger

Column 5 of the HMT specifies the packing group assigned to the material. Some materials are assigned to more than one packing group; if that is the case, **the shipper must determine the correct packing group for the hazardous material**. The packing group of the material will have an effect on a material's packaging requirements. This grouping is according to the relative degree of danger presented by the hazardous material (HM). That is:

- Packing Group I (PG I) means great danger;
- Packing Group II (PG II) means medium danger; and
- Packing Group III (PG III) means minor danger.

This module assumes that the correct packing group was assigned by the manufacturer or the shipper.

172.101(f)

STUDENT RESPONSE NOTE 30

Column 5 of the HMT lists the packing group assigned to the material. The packing group that indicates great danger is PG I, medium danger is PG II, and minor danger is PG III.

31

PACKING GROUP NUMBER

○ No Packing Group for:

- Classes 2 and 7
- Div. 6.2 (not regulated medical waste)
- Some Class 9 materials
- ORM-D materials

The packing group number must be indicated in Roman numerals on shipping papers when applicable and may be preceded by the letters “PG.” There are no packing groups for Class 2 and Class 7, Division 6.2 (other than regulated medical waste), some Class 9 and ORM-D materials.

172.101(f); 173.134(c)

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On shipping papers, the hazardous material must be accurately described and identified with:

- the proper shipping name (including the technical name, when applicable),
- hazard class or division,
- the ID number, and
- the packing group (when applicable).

All shipping papers must describe the hazardous materials in this **sequence**:

1. proper shipping name,
2. hazard class or division,
3. ID number, and
4. packing group.

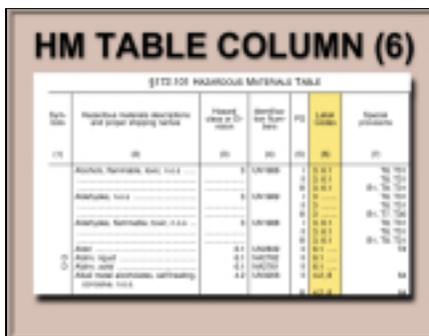
These four items are known as the hazardous material’s **basic description**.

172.101; 172.202(b)

STUDENT RESPONSE NOTE 31-32

The basic description consists of proper shipping name, hazard class or division, identification number and packing group (when applicable).

33



Column 6 of the HMT specifies label codes which represent the hazard warning labels required to be applied to each package of hazardous material(s), **unless excepted**.

Additional labeling requirements are in 172.402.

If two label codes are listed, the first represents the primary hazard and the next the subsidiary hazard.

172.101(g)

35

HM TABLE COLUMN (8)

Hazardous Material Name	PG	Label Code	Special Provisions	Packaging Section(s)			Quantity
				Exception	Non-bulk	Bulk	
UN2818	3	...	28.01, 11	101	201	202	0.1
UN2818	3	...	28.01, 11, 11	101	201	202	0.1
UN2818	3	...	28.01, 11	None	201	202	0.1
UN2818	3	...	28.01, 11	None	201	202	0.1
UN2818	3	...	28.01, 11	None	201	202	0.1

(8A) Exceptions
(8B) Non-bulk
(8C) Bulk

You identified the material from Columns 2, 3, 4, 5, 6, and 7. Now, the material needs to be packaged in accordance with the HMR. Packaging is in Column 8 of the Table. Notice that Column 8 is divided into Column (8A), (8B) and (8C).

Column (8A) lists the section in the regulations that cover exceptions to packaging requirements. When Column (8A) shows “None”, there are **no exceptions**. Then, Column (8B) or (8C) **must** be used.

Column (8B) [Non-bulk] lists the packaging section(s) that must be used to prepare HM for non-bulk shipment(s).

Column (8C) [Bulk] lists the packaging section(s) that must be used to prepare HM for bulk shipment(s).

Packaging will be discussed in Module 3.

172.101(i)

STUDENT RESPONSE NOTE 34-35

Packaging requirements are listed in Column 8. Column (8A) lists packaging exceptions. Column (8B) lists specific packaging requirements for non-bulk packages. Column (8C) list specific packaging requirements for bulk packages.

36

HM TABLE COLUMN (8)		
8B Packaging reference - Rows (173.1-1)		
Ex-OSQ-Forms	Non-Bulk	Bulk
(8A)	(8B)	(8C)
None	211	242

(8B) = 173.211
(8C) = 173.242

For Columns (8A), (8B), and (8C), the numbers listed in the columns are located in Part 173. For example: the number “211” in column (8B) indicates that the specific non-bulk packaging requirements are found in 173.211. Also, the number “242” in Column (8C) indicates that the specific bulk packaging requirements are found in 173.242.

When the packaging reference is not applicable to the form (solid or liquid) being transported, use the Solid/Liquid Table in 172.101(i)(4) to determine the correct packaging.

172.101; 172.101(i)(4)

Student Activity

We will now do a work project using the HMT. Please open your manual to Work Project HMT-1 page 26 and follow the directions to student(s).

Using the list of hazardous materials and the HMT, complete the chart. A ruler or paper marker is helpful to follow the correct line across the Table.

When you have completed and checked your work for accuracy, either review the work project with the instructor or check the answers on page 35.

Pause the presentation while you complete this Student Activity.

37

HM TABLE COLUMN (9)

§172.101 HAZARDOUS MATERIALS TABLE									
(8) Packaging (17)(1)			(9) Quantity Limitations				(10) Vessel Stowage		
Excess Bulk	Non-Bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Other	Location	Other	Other	Other
(9A)	(9B)	(9C)	(9D)	(9E)	(9F)	(10A)	(10B)	(10C)	(10D)
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209
None	201	202	203	204	205	206	207	208	209

(8) Maximum net quantity in one package
 (9A) Passenger aircraft or Passenger railcar
 (9B) Cargo aircraft only

Column 9, “Quantity Limitations,” addresses special concerns for air and rail shipments. It limits the quantity of material per package or forbids the offering or transporting of the material by aircraft or passenger carrying rail car. The quantity limits are **net quantity limits** unless otherwise noted, that is, the total volume or weight of the hazardous material, not including the weight of the package.

Column 9 is divided into two (2) columns:

- (9A) for passenger carrying aircraft and passenger carrying rail cars; and
- (9B) for cargo aircraft, that is, for aircraft with no passengers.

172.101(j)

STUDENT RESPONSE NOTE 36-37

Column 9 of the HMT limits or forbids offering or transporting of hazardous materials by passenger-carrying aircraft, passenger-carrying rail car or cargo aircraft.

38

HM TABLE COLUMN (10)

§172.101 HAZARDOUS MATERIALS TABLE									
(8) Packaging (17)(1)			(9) Quantity Limitations				(10) Vessel Stowage		
Excess Bulk	Non-Bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Other	Location	Other	Other	Other
(9A)	(9B)	(9C)	(9D)	(9E)	(9F)	(10A)	(10B)	(10C)	(10D)
None	42	None	Passenger	Passenger	5	(10A)	(10B)	(10C)	(10D)
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110
101	102	103	104	105	106	107	108	109	110

(10A) Location
 (10B) Other

Column 10, “Vessel Stowage,” is divided into two (2) columns:

- (10A) “Location” and
- (10B) “Other.”

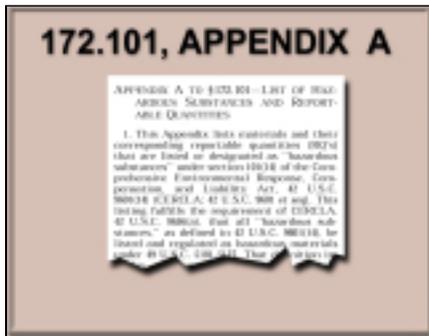
Please turn to 172.101(k) and read the authorized stowage locations (1) through (5).

172.101(k)

STUDENT RESPONSE NOTE 38

Column 10 of the HMT specifies requirements for transportation of hazardous material by cargo and passenger carrying vessels.

39



Hazardous materials often fit more than one category: hazardous substance, marine pollutant, and/or hazardous waste. For example, a material may be classed as a Class 3 material (flammable liquid) and also meet the definition of a hazardous substance.

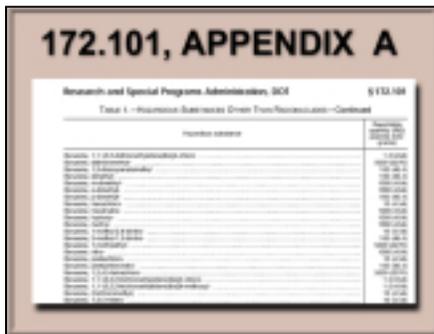
Please read the definition of hazardous substance in 171.8

A hazardous substance is a material that is:

- listed in Appendix A to the HMT;
- shipped in **one package**, in a quantity which equals or exceeds the Reportable Quantity (RQ); and
- for a mixture or solution is in a concentration by weight equal to or exceeding that shown in the table in 171.8.

171.8

40

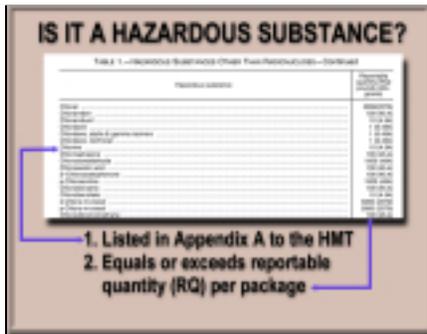


Hazardous substances are listed in Appendix A to 172.101, “List of hazardous substances and reportable quantities.” Appendix A has two tables:

- Table 1: Hazardous Substances other than Radionuclides
- Table 2: Radionuclides

172.101, App. A

41



To determine if a material is a hazardous substance, you must use Appendix A. To determine the proper shipping name, you use the HMT. It's a two-step process.

Please turn to Appendix A. It's at the end of the HMT.

To determine whether or not a particular package is regulated as a hazardous substance, you must determine:

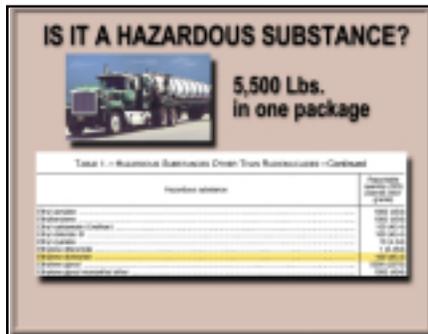
- the specific name of the material, such as "Ethylene dichloride;"
- the RQ for the material, as listed in Appendix A, if the material is listed as a hazardous substance, and
- the amount in **one package**.

A package is the container in which the product is shipped; for example, a fiberboard box, a drum, a cylinder, a tank truck, etc. Multiple packages consolidated into an overpack or into a freight container do not have their net quantities added together for RQ consideration.

Now we will work through the process with the hazardous material "Ethylene dichloride."

172.101, Appendix A

42



Student Activity

Find the name “Ethylene dichloride” in the left-hand column of Appendix A. Follow across the page to the far right column, entitled “Reportable Quantity (RQ).” Reportable quantities are shown in pounds and kilograms. The RQ for Ethylene dichloride is 100 pounds or 45.4 kilograms **per package**.

For this example, let’s assume we have 5,500 pounds of “Ethylene dichloride” in a cargo tank, which is **one package**. The material is not in a mixture or solution.

Is the “Ethylene dichloride,” as packaged, a hazardous substance?

The first question to ask yourself is “Is the material listed in Appendix A?”

Yes, it is.

The next question is “Does the amount of material equal or exceed the RQ for ‘Ethylene dichloride?’”

Yes, it meets the RQ, there are more than 100 pounds in one package.

Therefore, as packaged here, “Ethylene dichloride” is a hazardous substance.

171.8; 172.101, App. A

STUDENT RESPONSE NOTE 39-42

When a hazardous material is listed in Appendix A and the amount of material in one package meets or exceeds the Reportable Quantity, the hazardous material is also a hazardous substance.

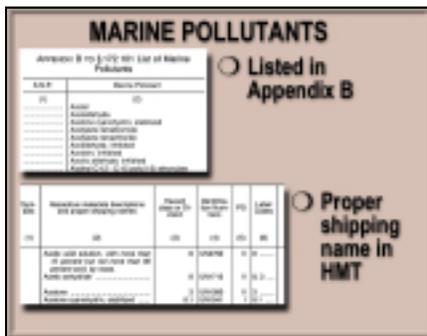
Student Activity

We will now do a work project on Appendix A to reinforce this point. Open your Student Manual to Work Project HMT-2 on page 28 and follow the directions to student(s).

When you have completed the project, either review the work project with the instructor or check the answers on page 36.

Please pause the presentation while you complete this Student Activity.

43



The shipper must also determine if the material is a “marine pollutant.” Marine Pollutants are listed in Appendix B to 172.101, “List of Marine Pollutants.”

Please read the definition of a marine pollutant in 171.8 and the exceptions in 171.4.

The HMR marine pollutant requirements always apply when marine pollutants are transported by vessel; they do not apply to non-bulk shipments transported by air, rail, or highway.

Marine pollutants are identified in Appendix B, but the proper shipping name comes from the HMT. If the proper shipping name is not listed in the HMT, look up *Marine Pollutant*. *Marine Pollutant* is italicized, and refers you to the Roman type entry, Environmentally hazardous substances, liquid or solid, n.o.s.

171.4; 171.8; 172.101, App. B



This concludes the instruction and practice portion of this module. Now is the time to assess how well the module taught you. This will be an open book test. There are no “trick” questions. Unless instructed otherwise, please complete the **Module 1 Test**. The **Module 1 Test** begins on page 30 of your Instructor Manual.

Instructor Note:

Please check test answers, record scores, and update training records. Review test results with students.

Student Response Note Answers begin on page 33.

Work Project Answers begin on page 35.

Module 1 Test Answers begin on page 37.

Work Projects

Hazardous Materials Table, 172.101

Work Project HMT-1

Directions to Student(s)

The objective of the Hazardous Materials Table work project is to provide a practical exercise. Work Project HMT-1 lists eight shipping names. Determine, from the HMT, whether each shipping name is an authorized shipping name. If the shipping name is correct, write “yes” in Column 2. If the shipping name is incorrect, determine and write the correct shipping name in Column 2.

Next, using the HMT, record in the appropriate column of the work project:

- the correct hazard class or division in Column 3;
- ID number in Column 4;
- packing group (PG) in Column 5 (if applicable);
- label codes in Column 6;
- special provisions, if any, in Column 7;
- packaging exceptions, if any, in Column (8A), and
- specific packaging sections in Columns (8B) and (8C).

Self-Evaluation

The work project will evaluate your skill and facility in use of the HMT, 172.101. When you have completed and checked your work for accuracy, either review the work project with the instructor or check the answers on page 35.

Hazardous Materials Table Work Project

HMT-1

Name*	Proper Shipping Name	Hazard Class or Division	ID Number	PG	Label	Special Provisions	Packaging Exceptions	Non-Bulk Packaging	Bulk Packaging
Col. 1	Col. 2	Col. 3	Col. 4	Col.5	Col. 6	Col. 7	Col. (8A)	Col. (8B)	Col. (8C)
Aluminum phosphide									
Amyltrichlorosilane									
Chlorodifluoromethane R22									
Metal, alkyl, solution, n.o.s.									
Articles, pyrophoric									
Ethyl nitrite solutions									
Electrolyte (acid) battery fluid									
Cotton									

* If the shipping name shown is correct, write yes in column 2. If incorrect, write the correct shipping name in Column 2.

Hazardous Materials Table, Appendix A Work Project

Work Project HMT-2

Directions to Student(s)

The objective of the HMT, Appendix A Work Project is to provide a practical exercise. Work Project HMT-2 lists eight shipping names. Determine if the materials are listed in Appendix A and indicate “yes” or “no” in Column 2 of the HMT-2 Work Project.

In Column 3 enter the Reportable Quantity (RQ) in kilograms or pounds.

Is the material also listed in the HMT? Indicate “yes” or “no” in Column 4.

Self-Evaluation

The work project will evaluate your skill in understanding the relationship between the HMT and Appendix A to the HMT. When you have completed and checked your work for accuracy, either review the work project with the instructor or check the answers on page 36.

Hazardous Materials Table Appendix A Work Project

HMT-2

Name	Listed in Appendix A Yes or No	Reportable Quantity (RQ) (lbs/kg)	Listed in HMT Yes or No
Acetone			
2-Propenal			
Saccharin and salts			
Sodium nitrate			
Sulfur phosphide			
Toluene			
Aldrin			
Polychlorinated biphenyls (PCBs)			

Module 1 Test

1. Subpart B of Part 172 is entitled _____ .
2. The definition of a hazardous material is found in Section _____ of the Hazardous Materials Regulations.
3. What is the ID number for the proper shipping name “Nickel nitrate”?
_____ .
4. The label(s) required for a 10-pound net package of “Thorium nitrate, solid,” is/are _____ .
5. The proper shipping names for hazardous materials are found in Column _____ of the HMT.
6. The packaging requirements for the proper shipping name “Flammable liquids, nos, 3, UN1993, PG I” are found in Column. _____ , _____ , and _____ of the HMT.
7. The packaging exceptions for the proper shipping name “Flammable liquids, nos” are found in Column _____ of the HMT.
8. The hazard class or division for the proper shipping name “Consumer commodity” is _____ .
9. What is the Packing Group for Potassium peroxide?

10. The “+” in Column 1 of the HMT _____ .
 - a. identifies hazardous substances
 - b. fixes the ID number and shipping name
 - c. fixes the mode of transportation
 - d. fixes the proper shipping name, hazard class or division, and PG

11. "Sodium hypochlorite" is a proper shipping name.
 - a. True
 - b. False

12. "Chloroacetone (*unstabilized*)" is a proper shipping name.
 - a. True
 - b. False

13. "Butane" and "Liquefied petroleum gas" are both proper shipping names.
 - a. True
 - b. False

14. Castor beans are regulated when transported by_____.

15. The hazardous material "Boron tribromide, UN 2692" is regulated in _____ mode(s) of transportation.

16. A one-pound package of "Chloroform" is regulated in _____ modes of transportation.

17. The hazard class or division for "Propane" is _____.
 - a. 3 (Flammable liquids)
 - b. 5.1 (Oxidizer)
 - c. 2.1 (Flammable gas)
 - d. 2.2 (Nonflammable gas)

18. The labeling requirements for "Consumer commodity" are _____.
 - a. Poison label
 - b. Oxidizer label
 - c. No label required
 - d. Organic label

19. The specific non-bulk authorization requirements for "Mercury oxide" are found in Section _____.

20. "Aldrin, *liquid*" may be shipped by cargo aircraft only in packages not exceeding _____ each.

21. RQ means _____ .
22. A 110-pound package of “Allyl alcohol” is regulated as _____ .
- a. a hazardous material
 - b. a hazardous substance
 - c. both a and b
 - d. not regulated
23. “Dieldrin” in one-pound packages is regulated as a hazardous substance.
- a. True
 - b. False
24. A shipment of “Aniline” weighing 5,000 pounds, packaged in metal drums with a gross weight of 100 pounds each, is regulated as a hazardous substance.
- a. True
 - b. False
25. The letter “G” in Column 1 identifies _____ .
- a. hazardous materials
 - b. hazardous substances
 - c. marine pollutants
 - d. n.o.s. and generic proper shipping names

Answer Sheets

Student Response Note Answers

- 1-2 The Hazardous Materials Table, 172.101, lists hazardous materials alphabetically, by proper shipping name, along with other information for preparing shipments for transportation.
- 3-4 In the HMT, the six symbols in column 1 are: +, A, D, I, G, and W
- 5-7 **Do not change** the proper shipping name, hazard class or division, or packing group of a “+” entry material, unless authorized by the USDOT.
- 8-9 “A” means regulated if transported by air, **unless** the hazardous material is also a hazardous substance or hazardous waste. In that case, it’s regulated in **all** modes of transportation.
- 10-14 A “G” in Column 1 identifies n.o.s. and generic proper shipping names which require the addition of one or more technical names.
- 15 Proper shipping names are shown in Roman type in the HMT.
- 16-18 The word “*or*” in italics means that any of the terms in the sequence may be used as part of the proper shipping name, as appropriate.
- 19-20 Proper shipping names may be written in the singular or plural, in CAPITALS or in lower case.
- 21-22 For domestic transportation, the word “poison” or “poisonous” may be used interchangeably with the word toxic.
- 23-24 When qualifying words are used, the sequence is **optional**; but the HMT sequence is preferred.
- 25 When the material is a hazardous waste and the word “waste” is not included in the HMT description, the word “waste” **must precede** the listed proper shipping name.
- 26 The word mixture or solution shall be added to the name of the hazardous material, as appropriate.

- 27 Column 3, lists the hazard class or division of the material or the word “Forbidden.” Class 3 materials may be reclassified as “Combustible liquids” in accordance with 173.150(e)-(f).
- 28 The identification number assigned to the material is in Column 4 of the HMT.
- 29 Use UN and a 4 digit ID number for international and/or domestic descriptions. Some materials have NA and a 4 digit ID number to describe the material when being transported either within the United States or between the U.S. and Canada only.
- 30 Column 5 of the HMT lists the packing group assigned to the material. The packing group that indicates great danger is PG I, medium danger is PG II, and minor danger is PG III.
- 31-32 The basic description consist of proper shipping name, hazard class or division, identification number and packing group (when applicable).
- 33 Column 6 of the HMT lists the label codes representing the hazard warning label(s) to be applied to hazardous materials packages.
- 34-35 Packaging requirements are listed in Column 8. Column (8A) lists packaging exceptions. Column (8B) lists specific packaging requirements for non-bulk packages. Column (8C) list specific packaging requirements for bulk packages.
- 36-37 Column 9 of the HMT limits or forbids offering or transporting of hazardous materials by passenger-carrying aircraft, passenger-carrying rail car or cargo aircraft.
- 38 Column 10 of the HMT specifies requirements for transportation of hazardous materials by cargo and passenger carrying vessels.
- 39-42 When a hazardous material is listed in Appendix A and the amount of material in one package meets or exceeds the Reportable Quantity, the hazardous material is also a hazardous substance.
- 43-44 Marine pollutants are listed in Appendix B to the HMT.

Hazardous Materials Table Work Project Answers

HMT-1

Name*	Proper Shipping Name	Hazard Class or Division	ID Number	PG	Label	Special Provisions	Packaging Exceptions	Non-Bulk Packaging	Bulk Packaging
Col. 1	Col. 2	Col. 3	Col. 4	Col.5	Col. 6	Col. 7	Col. (8A)	Col. (8B)	Col. (8C)
Aluminum phosphide	yes	4.3	UN1397	I	4.3, 6.1	A8, A19, B100, N40	None	211	242
Amyltrichlorosilane	yes	8	UN1728	II	8	A7, B2, B6, N34, T8, T26	None	202	242
Chlorodifluoromethane R22	yes	2.2	UN1018	None	2.2	None	306	304	314/315
Metal, alkyl, solution, n.o.s.	yes	3	NA9195	II	3	None	150	202	242
Articles, pyrophoric	yes	1.2L	UN0380	II	1.2L	None	None	62	None
Ethyl nitrite solutions	yes	3	UN1194	I	3, 6.1	None	None	201	None
Electrolyte (acid) battery fluid	Battery fluid, acid	8	UN2796	II	8	A3, A7, B2, B15, N6, N34, T9, T27	154	202	242
Cotton	yes	9	NA1365	None	9	137, W41	None	None	None

* If the shipping name shown is correct, write yes in column 2. If incorrect, write the correct shipping name in Column 2.

Hazardous Materials Table
Appendix A Work Project Answers
HMT-2

Name	Listed in Appendix A Yes or No	Reportable Quantity (RQ) (lbs/kg)	Listed in HMT Yes or No
Acetone	yes	5000/(2270)	yes
2-Propenal	yes	1/(0.454)	no
Saccharin and salts	yes	100/(45.4)	no
Sodium nitrate	no	—/—	yes
Sulfur phosphide	yes	100/(45.4)	no
Toluene	yes	1000/(454)	yes
Aldrin	yes	1/(0.454)	yes
Polychlorinated biphenyls (PCBs)	yes	1/(0.454)	yes

Module 1 Test Answers

Question	Answer/Explanation	49 CFR Reference
1.	Table of Hazardous Materials and Special Provisions.	
2.	171.8, Definitions and abbreviations.	
3.	UN 2725 Nickel nitrate, ID No. UN 2725, is in 172.101, Column 4.	
4.	Radioactive (7) and Oxidizer (5.1)	172.101, Column 6
5.	Column 2	
6.	Columns (8A), (8B), and (8C)	
7.	Column (8A), 172.101	
8.	ORM-D	172.101, Column 3
9.	PG I	172.101, Column 5
10.	d. Answers a, b, and c are not correct. Hazardous substances are identified in Appendix A of the HMT. They are listed by material and corresponding reportable quantities (RQs) and meet the hazardous substances definition in 171.8. The material ID number is listed in Column 4 of the HMT, 172.101. The mode of transportation is determined by the symbol shown in Column 1 of the HMT, i.e., unless the material is a hazardous substance or hazardous waste; “A” means regulated only by Air; “W” means regulated only by Water. A hazardous substance and/or hazardous waste is regulated in all modes of transportation. If there is no “A” or “W” in Column 1, the material is regulated in all modes of transportation.	172.101(b)(1)

11. b. False 172.101(c)
 “Sodium hypochlorite” is shown in HMT, in italics and not in Roman type. Therefore, it is not a proper shipping name.
12. b. False 172.101(c)
 “Chloroacetone, (unstabilized)” is not shown in the HMT as proper shipping name.
13. a. True 172.101(c)
 Both “Butane” and “Liquefied petroleum gas,” are shown in the HMT in Roman type.
 Therefore, both names are proper shipping names.
14. Air and Water
15. All modes
 There is no “A” or “W” in Column 1 of the HMT.
16. All modes 172.101(b)
 Chloroform is regulated in all modes of transportation.
17. c.
 2.1 (Flammable gas) is the division shown in Column 3 of the HMT, 172.101, for the proper shipping name “Propane”. 3 (Flammable liquids) and 2.2 (Nonflammable gas) are not listed as hazard class or division for “Propane.” There is no division 5.1 that is an “Oxidizer.”
18. c.
 No label is required, as shown in Column 6 of HMT.
19. 173.212
20. 60 liters
 Column (9B) of the HMT specifies the maximum net quantity in one package for cargo only aircraft.
21. Reportable quantity
 171.8, Definitions and Abbreviations

22. c. 172.101
It is listed in the HMT and in Appendix A to the HMT as a hazardous substance and it exceeds the reportable quantity (RQ) in one package for the material.
23. a. True
It is listed in Appendix A to the HMT as a hazardous substance, and it meets the reportable quantity (RQ) for the material.
24. b. False
It is listed in Appendix A to the HMT as a hazardous substance but it does not meet or exceed the reportable quantity (RQ) of 5,000 pounds per package.
25. d. n.o.s. and generic proper shipping names 172.101(b)(4)